# The Contributions on the Urban Ecology of Green Spaces in the Context of Sustainable Urban Development

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**Abstract:** The world is increasingly becoming an urban place. Urbanization increases the distance between people and natural space. Urban ecosystems differ from natural or rural ones in many obvious ways. Green space is an important part of complex urban ecosystems and provides significant ecosystem services. It benefits urban communities environmentally, aesthetically, recreationally and economically. In order to improve the environmental quality in cities and ensure its sustainability, it should be paid an attention to the establishment of green areas. This paper carried out to describe the importance of urban open green spaces which effect on urban climate, air quality, biological diversity and prevents erosion, noise and visual pollution within the framework of sustainable urban development.

**Keywords:** sustainable urban development, urban ecology, urban green spaces.

## Introduction

Some 65% of the world's population is expected to be urban by the year 2025 (Schell and Ulijaszek 1999). As a result of urbanization, the world's population has become increasingly concentrated in cities. Due to fast urbanization, natural ecosystems are increasingly replaced by urban development. Urban green spaces are an important component of the complex urban ecosystem. They have very important functions in the creation of a sustainable city. Green space has significant ecosystem services, which are defined as "the benefits human population derives, directly or indirectly, from ecosystem functions" (Costanza et al. 1997). In particular, for people living in large and dense cities, a good quality of life depends largely on the quality of the urban environment (Van Leeuwen et al. 2006). Originally, merely a decorative element in towns and cities, green space has now taken on a new value and function, the importance of which is widely acclaimed within the parameters of sustainable development (Sanesia and Chiarello 2006). The aim of this paper is to explanation importance of open green spaces for the quality of urban life within the framework of sustainable urban development.

## Urban ecosystem

Ecology is used to indicate the study of relations between living organisms (man, animals and plants) and their environment. Urban ecology is usually associated with 'nature in cities'. The city is also a part of nature; the processes of abiotic and biotic nature do not stop at the urban fringe. Sustainable urban development is bound to ecological limits. Urban ecology is the study of urban ecosystems. The city as a whole and parts of it can be described as ecosystems (Tjallingii 1992). Urban ecosystems differ from natural or rural ones in many obvious ways and are also often of poorer quality than their rural equivalents (Bolund and Hunhammar 1999). Human activities, such as building, traffic, or industrial production affect the quality of air, water, and soil which impacts ecosystems in many ways (Sukopp 2004). The future of earth ecosystems is increasingly dependent on the patterns of urban growth because cities are growing rapidly worldwide. Human activities are part of these systems and an analysis of their impact on the biotic and abiotic fields may provide us with guidelines for the planning of urban ecosystems. Thus ecological urban planning may become a way of planning all urban functions and areas. Ecological planning includes nature conservation and improvement, open and green space systems and environmental impact assessment studies.

## Sustainable urban development concept

Sustainability, in general terms, is the ability to maintain balance of a certain process or state in any system. It is now most frequently used in connection with biological and human systems. In an ecological context, sustainability can be defined as the ability of an ecosystem to maintain ecological processes, functions, biodiversity and productivity into the future. Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations to come. The term was used by the Brundtland Commission. The Brundtland Commission, formally the World Commission on Environment and Development (WCED), known by the name of its Chair Gro Harlem Brundtland was assembled by the United Nations in 1983. The commission was created to address growing concern "about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development." According to this report, sustainable development was defined as "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Anonymous 1991). The field of sustainable development can be conceptually broken into three constituent parts: environmental sustainability, economic sustainability and socio-political sustainability (Goodland 1995). Environmental sustainability means of ensuring continuity of natural resources includes biodiversity, human health, air, water and soil quality, protection of animal and plant life. Sustainable city planning is possible with ecological planning which is based on sustainability of natural resources. Urban green spaces have taken on a new value and function, the importance of which is widely acclaimed within the parameters of sustainable development.

## Urban green spaces functions

Urban green spaces are an important component of the complex urban ecosystem. Scottish Greenspace (2008) defined green spaces as pieces of vegetated land within or adjoining an urban area, including parks, gardens, natural or semi-natural areas, green corridors, and other functional green areas. More studies on benefits of green space in urban setting can be found in the literature. Green spaces, an important part of urban ecosystems, have significant ecological, social, cultural and economic functions. Their ecological functions can be explained as follows;

- Urban green spaces have intrinsic ecological value; they often have a variety of habitat types, which allows for high species diversity, including rare and threatened species (Chace and Walsh 2006).
- Green spaces improve air quality. They reduce air pollution, help to settle out, trap and hold particle pollutants (dust, ash, pollen and smoke) (Yang et al. 2005), can sequester carbon dioxide emissions and adsorb other dangerous gasses (Nowak and Crane 2002; McHale et al. 2007), produce oxygen, purify air (Jo 2002).
- Green spaces modify local climate, regulate microclimates and reduce the heat island effect (Shin and Lee 2005). Trees help cool the "heat island" effect in our inner cities. These islands result from storage of thermal energy in concrete, steel and asphalt. Heat islands are 3 to 10 degrees warmer than the surrounding countryside. The collective effect of a large area of transpiring trees (evaporating water) reduces the air temperature in these areas. They lower air temperature through shade, increase humidity in dry climates through evaporation of moisture reduce glare on sunny days and wind speed.
- Green spaces conserve water and reduce soil erosion (Jim 2001). They reduce surface runoff of water from storms, soil erosion and sedimentation in streams, increase groundwater recharge that is significantly reduced by paving, reduce wind erosion of soil, lesser amounts of chemicals transported to streams.
- Green spaces can reduce noise (Fang and Ling 2003). They absorb and block noise from the urban environment. Tree belts situated between the noise source and the receiver can reduce the noise level perceived by the receiver.
- Urban green spaces play a pivotal role in preserving biodiversity (Attwell 2000). Trees and associated plants create local ecosystems that provide habitat and food for birds and animals. They offer suitable mini-climates for other plants that could otherwise be absent from urban areas. Biodiversity is an important part of urban forestry.

Furthermore, green spaces such as public parks, natural areas and golf courses can have a statistically significant effect on the sale price of houses in close proximity to those resources (Luttik 2000; Kong et al. 2007) They contributes to public health and produce a vitamin ''G'' for health, well-being and social safety (Groenewegen et al. 2006). They create feelings of relaxation and well-being, provide privacy and a sense of solitude and security, shorten post-operative hospital stays when patients are placed in rooms with a view of trees and open spaces. People are eager to access these green spaces for recreation and to experience nature (De Groot and Van den Born 2003; Lynn and Brown 2003). Green spaces introduce the natural into the urban environment. They foster a connection between community residents and the natural environment that surrounds

them, thus allowing for a more liveable city. This is essential in order for a community to be sustainable. Trees add beauty and natural character to our cities and towns, provide us with colours, flowers, and beautiful shapes, forms and textures, screen harsh scenery, soften the outline of masonry, metal and glass, can be used architecturally to provide space definition and landscape continuity.

## Results

Green space has significant ecosystem services, which are defined as "the benefits human population derives, directly or indirectly, from ecosystem functions". To manage progress towards sustainable urban development, it is essential to develop suitable indicators, one of which is the quality and quantity of green spaces and related elements in the city. The planning and management of urban greening is of significance to urban sustainable development.

In future, the social and spatial implications of new lifestyles, values, attitudes to nature and sustainability will even lead to higher demands for urban green space. Green spaces provide numerous ecological, social, economic, health, and recreational benefits. To counter these trends, it is important to make sufficient provision of quality green space within urban areas as well as improve access to the countryside around towns.

Consequently, the management of urban green areas is an increasingly important issue. At the end of the evaluation of urban green spaces functions, some suggestions are cited:

-The management of urban green space including planning, design and resource management requires the collaborative working of many disciplines at different spatial scales.

-Urban green and open space planning policies need to be developed locally in order to satisfy local needs and to assist also in the achievement of national and international sustainability objectives.

-More integrated approaches as well as active involvement of the urban community, local authorities, local businesses and voluntary groups (e.g., NGOs), for the development and management of urban green spaces are needed.

-An improvement of quantity, quality and accessibility of green spaces in order to form the basis for a vision for urban green space is needed.

-To improve the quality of urban green spaces an up-to-date informative database is needed.

-The orderly and careful maintenance (irrigation, pruning, struggle with undesirable plant and animals etc.) must be followed after presentation of green spaces.

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